

Section 18. Weakfish

Introduction

Weakfish (*Cynoscion regalis*) occur along the Atlantic coast of North America from Canada to the East Coast of Florida but are most common from New York to North Carolina. Warming of coastal waters in the spring prompts an inshore and northerly migration of adults from their offshore wintering grounds to nearshore sounds, bays and estuaries. Surveys along the Atlantic coast indicate that estuaries provide feeding areas and spawning grounds for adult weakfish and are equally as important as nursery areas for juveniles. Adult weakfish are often found near the periphery of eelgrass beds most likely because weakfish primarily feed on shrimp, other crustaceans, and small fish that are found near these grass beds. In the fall, an offshore and southerly migration of adults coincides with declining water temperatures. The continental shelf from Chesapeake Bay to Cape Lookout, North Carolina appears to be the major wintering ground for weakfish.

Chesapeake Bay Management

The Chesapeake Bay Program (CBP) published the “Chesapeake Bay Weakfish and Spotted Seatrout Fishery Management Plan” in December 1990 for the purpose of enhancing and perpetuating the weakfish and spotted seatrout stocks within the Chesapeake Bay and its tributaries. At that time, the 1984 coastwide stock assessment suggested that the weakfish stock was overfished but additional data was needed to make a more definitive evaluation. There was concern about the incidental bycatch of small weakfish and conflicts between the recreational and commercial fisheries. The CBP plan used the Atlantic States Marine Fisheries Commission (ASMFC) guidelines to develop strategies and actions to obtain data for a more rigorous coastal stock assessment; implement minimum size limits; reduce bycatch; and address recreational/commercial conflicts.

As coastal management measures were implemented and the weakfish stock was rebuilt, the 1990 CBP FMP was revised in 2003. The new plan addressed the change in stock status from overfished to fully exploited. The 2003 plan includes new biological and life history data such as preferred water quality conditions, spawning trends, fecundity analysis, growth estimates, and the temporal distribution of weakfish at specific life history stages in the Chesapeake Bay. A synopsis of the 2003 plan can be found on Table 18.1. The 2003 plan continues to utilize the guidelines established by the ASMFC and the Mid-Atlantic Fishery Management Commission (MAFMC) for coastwide management of the species.

Atlantic Coast FMP

A coastal FMP for weakfish was developed and adopted by ASMFC in 1985 and recommended: a delay in harvest until age 1; the use of trawl efficiency devices in the southern shrimp fisheries (now more commonly referred to as bycatch reduction devices); and, a cooperative interstate research program. The continued decline in weakfish landings prompted the development of ASMFC Amendment #1 in 1992. Amendment #1 proposed a phased reduction in exploitation by 15% during 1992, meeting a 50% reduction by 1995, and restoring

the stock over a 10-year period. No state was judged in compliance during 1993 and the ASMFC Weakfish Technical Committee encouraged the states to fully implement the amendment. Since Amendment #1 was not successful in improving the status of weakfish, a second amendment was developed in 1995. In the interim between amendments, the Atlantic Coastal Fisheries Cooperative Management Act was adopted and gave ASMFC authority to close a state's fishery if they did not comply with the ASMFC requirements. Amendment #2 proposed coastwide minimum size limits, a reduction in exploitation by 25% for the 1995/1996 fishing season, minimum mesh sizes and a reduction in bycatch in the shrimp trawl fishery. However, lower than average commercial and recreational catch rates, a lack of older fish, variable recruitment strength, and below average spawning stock biomass (SSB) mandated further improvements. Amendment #3 (1996) was designed to reduce fishing mortality (F) to 0.50 by 2000, restore an expanded age structure, and restore fish to their full geographical extent. Under Amendment #3, weakfish commercial fisheries were regulated by a combination of season and area closures as well as mesh regulations. Bycatch reduction devices (BRD) were required for shrimp fisheries in the South Atlantic to reduce mortality of age 0 and 1 weakfish. The weakfish recreational fishery was regulated by equivalent, state-specific minimum size and possession limits. Each state used management scenarios that are equivalent to or more conservative than 12 inches minimum size and the 4 fish bag limit. Creel limits were not required once minimum size increased to 16 inches. Amendment #3 completely replaced all previous amendments.

In 2000, stock assessment committee concluded that weakfish were at high levels of biomass and that fishing mortality in 1998 was below the management target of 0.5 for the year 2000. This indicated that the weakfish management had met many of the goals it set to achieve in Amendment #3. The committee recommended continuing low fishing mortality levels in order to expand the size and age structure of weakfish stocks and ensure an appropriate spawning stock biomass.

Based on the most recent evaluation of the stock, there are conflicting measures and disagreement as to what the data indicates. Upon reevaluation of the target reference point in Amendment #3, it seems the point was too high to ensure a proper spawning stock biomass. Also, the recreational reference period in Amendment #3 did not reflect age and size structure of the weakfish population fished at a target F over an extended time period. These issues led to the development of Amendment #4. The new amendment supercedes previous management measures. The intent of the new amendment is to "establish a control rule to accurately categorize the status of the stock by considering both fishing mortality and spawning stock biomass, simultaneously" (ASMFC 2005). By providing targets and thresholds based on both indicators, a series of factors is used to evaluate the status of the stock. The Technical Committee recommended adopting the period between 1981 and 1985 as the reference because it better represents a healthy stock instead of the original 1990s reference period. Amendment #4 maintains current fishery management measures, a new recreational reference period, and revised reference points. States are required to complete an annual compliance report (Appendix 12).

Stock Status

A coastal weakfish stock assessment was completed in 1999 and reported that the weakfish stock was at a high level of abundance with low fishing mortality rates. The 2002 update also stated that the weakfish stock was continuing to increase but that the absolute magnitude of the increase could not be stated with certainty (Kahn 2002). In 2004, the stock assessment committee examined a variety of assessment approaches but the review did not result in developing a definitive status of the stock. There were contradictions between the survey data that show high survival and high recruitment, and the catch data that show high survival and low recruitment.

The most recent stock assessment was completed in 2005. It appears that the estimates used in prior stock assessments were biased when compared to a retrospective analysis. As data from a new year is added to the running total, the value of F for previous years will change. This bias caused F to be underestimated in recent years and stock size to be over-estimated in recent years. The difficulties encountered with calculating stock assessment values have not been totally resolved. The weakfish stock is at a moderate level of abundance and fishing mortality appears to be low. Recent history of the coast-wide stock shows that spawning stock biomass (SSB) estimates were low from 1982 through 1985 (22,046,226 pounds). There was high recruitment to age 1 in 1985-1987 that produced an increase in biomass but fishing mortality was high. By 1989, biomass had declined and remained low through 1993. Since then, biomass has been building to higher levels. Although one recent estimate is over 110,231,131 pounds, this could be overstated by 50%. An estimate corrected for bias would be approximately 77,161,791 pounds while another estimate is 51,896,816 pounds. These estimates indicate an increase in stock size. While the exact level of bias in the most recent estimates is unknown, the current level of SSB is above the proposed threshold level of $SSB_{THRESHOLD} = 31,746,565$ pounds.

Estimates of fishing mortality (F) range from a high of 2.52 (1984) to a low of 0.12 (2000). Since 1995, estimates of F have been below the Amendment #3 target of 0.50. The 2000 estimate could be underestimated by almost 100% based on retrospective analysis. Despite this bias, the corrected value would still be well below the proposed F_{TARGET} of 0.31 ($F_{30\%}$) and far below the proposed $F_{THRESHOLD}$ of 0.50 ($F_{20\%}$). The low estimates of F indicate that fishing is not the primary reason the stock has decreased in recent years. Increased natural mortality due to the low abundance of food availability may be one reason for the lower stock biomass.

With decreasing F , there has been an increase in the size and age structure of the stock. In 1990, the estimated proportion of age 6+ fish had decreased to a low of 0.3%. The most recent estimate indicates age 6+ fish have increased to 6.8% of the total.

Fishery Statistics

Commercial Fishing Harvest

Recent regulatory efforts to reduce weakfish fishing mortality have lowered the commercial harvest of weakfish in both Maryland and Virginia. The mean annual weakfish harvest in Maryland from 1950-2004 was approximately 314,891 pounds (Table 18.2). In

comparison, the mean annual weakfish harvest for 2000-2004 was approximately 113,823 pounds. For Virginia, the 1950–2004 mean annual harvest was 2,081,562 pounds and the 2000-2004 mean annual commercial harvest was 885,128 pounds (Table 18.2). Annual harvest records for the commercial weakfish harvest (Figure 18.1) show that the 2004 harvest is below the harvest of recent years.

Table 18.2. Commercial Weakfish Harvest from the Chesapeake Bay

| Mean Annual Harvest For: | Maryland Harvest (lbs.) | Virginia Harvest (lbs.) |
|--------------------------|-------------------------|-------------------------|
| 1950-1959 | 316,780 | 2,300,930 |
| 1960 – 1969 | 182,000 | 1,182,140 |
| 1970 – 1979 | 473,350 | 3,775,950 |
| 1980 – 1989 | 466,306 | 2,410,238 |
| 1990 – 1999 | 256,157 | 1,336,768 |
| 2000 – 2004 | 113,823 | 885,128 |
| Overall (1950 – 2004) | 314,891 | 2,081,562 |

Recreational Fishing Harvest

Estimated recreational weakfish harvest in the Chesapeake Bay region has also declined in recent years (Figure 18.2). The decline is attributed to restrictive fishing regulations and the increased striped bass population, direct competitors with weakfish. The estimated mean annual recreational weakfish harvest for Maryland based on 1980-2003 harvest records is 565,583 pounds (Table 18.3) while the estimated mean annual harvest from Maryland for 2000-2003 is 365,762 pounds. Virginia weakfish recreational harvest records also demonstrate a similar decline from an estimated mean of 793,866 pounds for 1980-2003 to 336,044 pounds for 2000-2003. Prior to 1980, estimates of recreational harvest data are not available.

Table 18.3. Estimated Recreational Harvest of Weakfish from the Chesapeake Bay

| Mean Annual Harvest For: | Maryland Harvest (lbs) | Virginia Harvest (lbs) |
|--------------------------|------------------------|------------------------|
| 1980 – 1989 | 1,011,931 | 1,562,353.22 |
| 1990 – 1999 | 243,797 | 285,357.40 |
| 2000 – present | 365,762 | 336,044.25 |
| Overall Avg: | 565,583 | 793,866.52 |

Summary

The weakfish stock is at a moderate level of abundance and fishing mortality appears to be low but the stock assessment must be refined in order to increase the resolution of the stock biomass estimates.

References

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Atlantic States Marine Fisheries Commission. 1995. Amendment #2 to the Interstate Fishery Management Plan for Weakfish.

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Chesapeake Bay Program (CBP). 1990. Chesapeake Bay Weakfish and Spotted Seatrout Fishery Management Plan.

Kahn, Desmond M. 2002. Stock Assessment of Weakfish Through 2000, Including Estimates of Stock Size on January 1, 2001. A Report to the Weakfish Technical Committee of the Atlantic States Marine Fisheries Commission.

Figure 18.1. Commercial Landings of Weakfish from Maryland and Virginia, 1950-2004

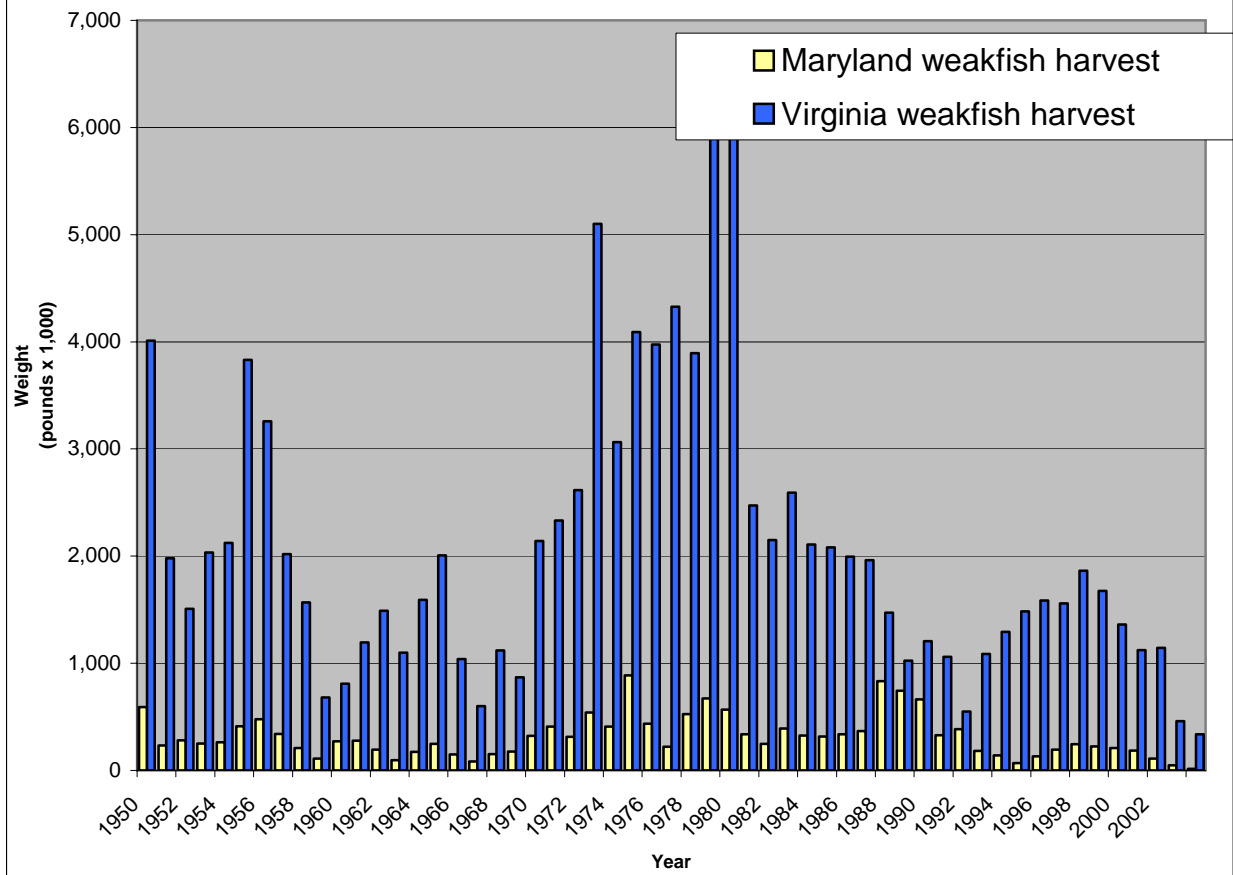


Figure 18.2. Estimated Recreational Weakfish Harvest from Maryland and Virginia, 1981-2004

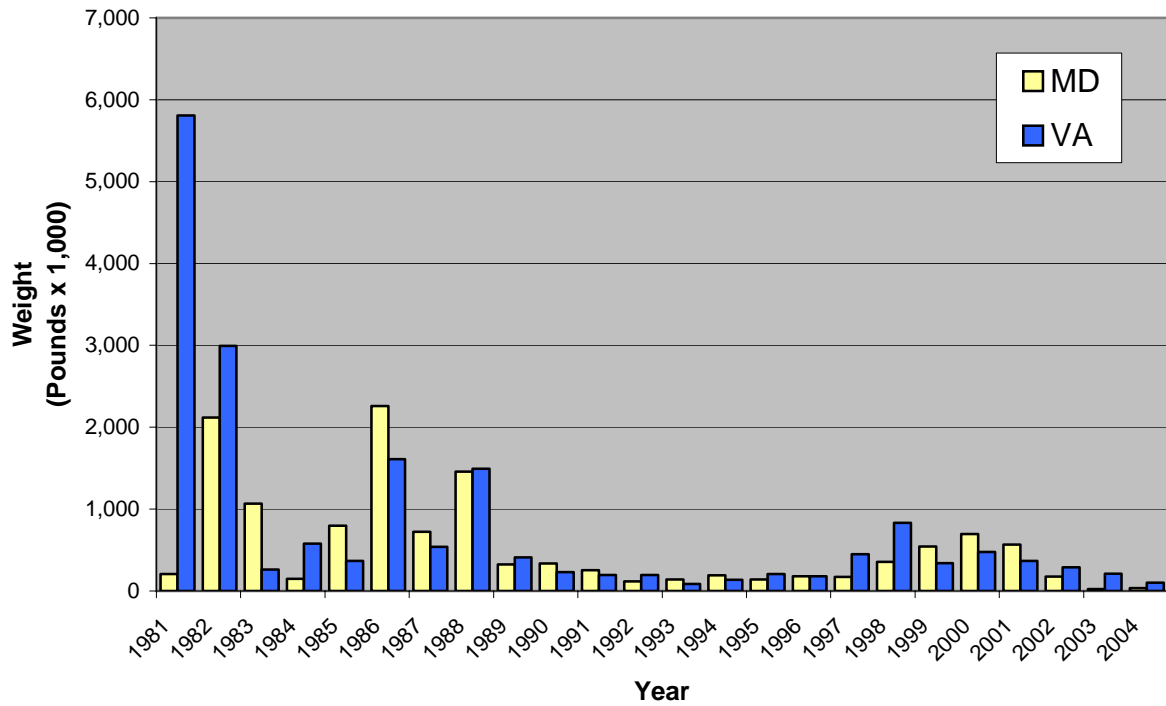


Table 18. 1. 2003 Chesapeake Bay Program Weakfish Fishery Management Plan Implementation (10/05)

| Section | Action | Implementation | Comments |
|---|--|---|--|
| <p>Stock Status Management Strategy:</p> <p>CBP jurisdictions will adopt biological reference points (BRPs) that reflect the most current status of the weakfish stock. As data becomes available on multi-species interactions and ecological considerations such as species interactions, food webs, by catch, biodiversity and habitat, the BRPs should be modified accordingly.</p> | <p>Action 1.1 MD, PRFC (Potomac River Fisheries Commission) and VA will adopt the Atlantic States Marine Fisheries Commission's (ASMFC) recommendations for the coast wide management of weakfish</p> | <p>Annually reviewed and adjusted if necessary</p> | <p>The most recent assessment indicates that weakfish are at a moderate level of abundance and F is low. The current level of SSB is above the proposed threshold level of 31.8 million pounds. Size and age structure of the stock is increasing.</p> |
| | <p>Action 1.2 In order to achieve the fishing target rates defined by the adopted BRPs, CBP jurisdictions will utilize a combination of size limits and possession limits, and/or seasons or areas to manage the commercial and recreational fishery in state waters.</p> | <p>Annually</p> | <p>CBP jurisdictions will recreational creel limit/minimum size regulations as specified in ASMFC Amendment 4 of the Weakfish FMP. CBP jurisdictions must prove conservational equivalency and that new measures do not contribute to increased F.</p> |
| <p>The Fishery Management Strategy:</p> <p>The CBP jurisdictions will regulate the commercial and recreational fishery based on the most recent status of the stock and the established fishing targets.</p> | <p>Action 2.1 The CBP jurisdictions will consider regional differences when determining state allocation issues and regulations.</p> | <p>As necessary</p> | |
| | <p>Action 2.2 The CBP jurisdictions will consider the economic impacts of management measures on the fishery and promote the utilization of economic data in the management decision process.</p> | <p>Dependent on the availability of economic data</p> | <p>Collection of economic data for the commercial fishery should include dockside values, the number of commercial vessels, the number of commercial fishermen and the economic returns from the commercial fishery. Data collection for the recreational fishery should include the number of anglers, the number of directed trips and angler expenditures. Detailed data collection will enable the development of bio-economic models that can estimate costs or benefits to consumers resulting from fishery regulations.</p> |

Table 18. 1. 2003Chesapeake Bay Program Weakfish Fishery Management Plan Implementation (10/05)

| Section | Action | Implementation | Comments |
|--|--|----------------|---|
| . | Action 2.3 The CBP jurisdictions continue to support the use of BRDs in non-directed fisheries and the appropriate mesh sizes in directed fisheries, to reduce the fishing mortality on small weakfish. | Annually | |
| Research and Monitoring: The CBP jurisdictions will continue to monitor the biological characteristics of the weakfish stock in the Chesapeake Bay and coordinate monitoring activities within the Bay and the Atlantic coast. | Action 3.1 The CBP jurisdictions will continue fishery dependent sampling and improve catch data. Economic information from the recreational and commercial fisheries will also be reviewed. | Continue | Monitoring data provides information on abundance; age structure and Y-O-Y recruitment. |
| | Action 3.2 The CBP jurisdictions will conduct fishery independent sampling and collect data on abundance, age structure and recruitment. | Continue | The ASMFC Weakfish FMP stipulates that states, which harvest 150,000 lbs. or more of weakfish, must submit otoliths and fish lengths as data for the coastal stock assessment. |
| | Action 3.3 CBP jurisdictions will continue to coordinate state activities with the Atlantic Coast Cooperative Statistics Program (ACCSP). | Continue | The monitoring requirement will be based on will be based on a 2 year average. |
| | Action 3.4 The CBP jurisdictions will begin to collect and examine stomach contents data and examine the effects of environmental variables upon weakfish growth rates. | On-going | Data from the ChesMMAP Survey, CHESFIMS project and the MD Winter Trawl Survey will be used to delineate species interactions and predator/prey relationships. Results and trends can then be incorporated into CBP fishery management plans. |

Table 18. 1. 2003Chesapeake Bay Program Weakfish Fishery Management Plan Implementation (10/05)

| Section | Action | Implementation | Comments |
|--|---|-----------------|--|
| <p>Habitat Management Strategy: CBP jurisdictions will monitor and regulate activities which may be harmful to weakfish habitat.</p> | <p>The CBP jurisdictions will monitor and regulate activities, which may be harmful to weakfish habitat. Activities, which contribute to the degradation and or loss of habitat types that weakfish utilize throughout their life history stages will also be monitored and regulated by CBP jurisdictions.</p> | <p>On-going</p> | <p>CBP jurisdictions support the commitments of the Chesapeake Bay 2000 Agreement. These activities include the discharge of toxic pollutants or excessive nutrients into the Chesapeake Bay and its tributaries, interruption or changes in water discharge patterns, deposition of solid waste, sewage sludge or industrial waste into Bay (which may lead to anoxic conditions), rapid coastal development, unregulated agricultural practices, net coastal wetland loss or the dredging of contaminated sub-aqueous soils.</p> |
| | <p>Action 4.1 The CBP jurisdictions will monitor and regulate land-based activities and water-based activities that may negatively impact Chesapeake Bay water quality and weakfish spawning, rearing and foraging areas.</p> | <p>Continue</p> | |
| | <p>Action 4.2 The CBP jurisdictions will monitor important weakfish forage species to insure that activities, such as directed fisheries or incidental bycatch in non-directed fisheries, do not adversely affect abundance. These managed species, which serve as forage for weakfish include Atlantic croaker, spot, Atlantic menhaden, and blue crab. If fishing activities are contributing to higher F's on forage species, additional management measures may be necessary.</p> | <p>Continue</p> | <p>Data from the ChesMMAP, CHESFIMS, and the MD Winter Trawl Surveys will provide data on important forage species for weakfish.</p> |
| | <p>Action 4.3 The CBP jurisdictions will monitor the abundance of weakfish forage species that are not managed under CBP FMPs, such as bay anchovies, and Atlantic silversides, using on-going monitoring and surveys.</p> | <p>Continue</p> | <p>The MD Juvenile Striped Bass Survey and VIMS's Juvenile Abundance Monitoring Surveys(formerly known as the VIMS Trawl Survey and the VIMS Juvenile Seine Survey) will continue to monitor the abundance of important, non-managed forage species in the Chesapeake Bay.</p> |

Table 18. 1. 2003Chesapeake Bay Program Weakfish Fishery Management Plan Implementation (10/05)

| Section | Action | Implementation | Comments |
|---|---|----------------|---|
| Ecosystem Interactions Management Strategy: | Action 4.4 The CBP jurisdictions will continue to identify predator/prey interactions, both inter- and intraspecies competition and other interactions that might affect the management of weakfish. As multispecies interactions are evaluated and quantified, biological reference points and management strategies may be adjusted. | On-going | Data from the ChesMMAP, CHESFIMS and the MD Winter Trawl Survey will be collected and analyzed by CBP jurisdictions to identify inter- and intra-species weakfish competition and predator/prey interactions. |

ABBREVIATIONS

ASMFC = Atlantic States Marine Fisheries Commission

BRPs = biological reference points

CHESFIMS = Chesapeake Bay Fishery Independent Multispecies Fisheries Survey

ChesMMAP = Chesapeake Bay Multispecies Monitoring and Assessment Program

CBP = Chesapeake Bay Program

(F) = mortality due to fishing

FMP = fishery management plan

PRFC = Potomac River Fisheries Commission

(SSB) = spawning stock biomass

VIMS = Virginia Institute of Marine Science

Y-O-Y = young of the year fish